

## C L A I M S

## 1. A radar oscillator comprising:

an oscillating unit having amplifier means, and in order to contribute to oscillation at a predetermined frequency together with the amplifier means, at least one of a feedback circuit which applies a positive feedback from an output side to an input side of the amplifier means and a resonator which resonates at the predetermined frequency, the resonator being connected to an input section or output section of the amplifier means, the oscillating unit outputting and stopping an oscillation signal having the predetermined frequency from the output side of the amplifier means in an oscillating state and an oscillation stop state; and

switching means connected to the oscillating unit, the switching means being composed of an electronic switch which, receives a pulse signal indicating a transmission timing of a radar wave, and alternately changes an operating state of the oscillating unit between the oscillating state and the oscillation stop state at first and second levels of the pulse signal in order to intermit an output of the oscillation signal in response to a level of the pulse signal.

2. A radar oscillator according to claim 1, characterized in that the oscillating unit has both of the feedback circuit which applies a positive feedback from the output side to the input side of the amplifier

means and the resonator which resonates at the predetermined frequency, the resonator being connected to the input section or output section of the amplifier means, and outputs and stops the oscillation signal having the predetermined frequency determined by the resonator from the output side of the amplifier means in the oscillating state and the oscillation stop state.

3. A radar oscillator according to claim 1, characterized in that the oscillating unit has a plurality of amplifiers cascade-connected to each other as the amplifier means; also has both of the feedback circuit which applies a positive feedback to the input side of an amplifier at a first stage from the output side of an amplifier at a final stage of the plurality of amplifiers and the resonator which resonates at the predetermined frequency, the resonator being connected to a cascade-connecting section of the plurality of amplifiers; and outputs and stops the oscillation signal having the predetermined frequency determined by the resonator from the output side of the amplifier at the final stage of the plurality of amplifiers in the oscillating state and the oscillation stop state.

4. A radar oscillator according to claim 1, characterized in that the oscillating unit has a field effect transistor (FET) serving as the amplifier means and a distributed parameter line connected to the FET

and having a length such that the FET generates a negative resistance contributing to oscillation at a predetermined frequency; also has only the resonator which resonates at the predetermined frequency, the resonator being configured of a distributed parameter line connected to the input section of the FET and having a length of  $\lambda/4$  of the predetermined frequency; and outputs and stops the oscillation signal having the predetermined frequency determined by the resonator from an output side of the FET in the oscillating state and the oscillation stop state.

5. A radar oscillator according to claim 1, characterized in that the oscillating unit has a plurality of amplifiers cascade-connected to each other as the amplifier means; is configured as a ring oscillator circuit having only a feedback circuit which applies a feedback to an input section of an amplifier at a first stage from an output section of an amplifier at a final stage of the plurality of amplifiers; and outputs and stops the oscillation signal having the predetermined frequency determined by the ring oscillator circuit from the output section of the amplifier at the final stage in the oscillating state and the oscillation stop state.

6. A radar oscillator according to claim 1, characterized in that the oscillating unit has a high frequency earth line, and

the switching means includes a first switch which opens or closes between at least one of the input section and the output section of the amplifier means in the oscillating unit and the high frequency earth line of the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

7. A radar oscillator according to claim 1, characterized in that the oscillating unit has an element to set the oscillating unit outside of an oscillation enable range, and

the switching means includes a second switch which connects or disconnects the element to set the oscillating unit outside of the oscillation enable range to and from the oscillator based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

8. A radar oscillator according to claim 1, characterized in that the oscillating unit has a power supply line for the amplifier means in the oscillating unit, and

the switching means includes a third switch which opens or closes the power supply line for the amplifier

means in the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

9. A radar oscillator according to claim 1, characterized in that the oscillating unit selectively has a high frequency earth line, a power supply line for the amplifier means in the oscillating unit, and an element to set the oscillating unit outside of an oscillation enable range, and

the switching means includes a plurality of switches obtained by selectively combining:

a first switch which opens or closes between at least one of the input section and the output section of the amplifier means in the oscillating unit and the high frequency earth line based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state;

a second switch which connects or disconnects the element to set the oscillating unit outside of the oscillation enable range to and from the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the

oscillating unit between the oscillating state and the oscillation stop state; and

5 a third switch which opens or closes the power supply line for the amplifier means in the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

10 10. A radar oscillator according to claim 2, characterized in that the oscillating unit has a high frequency earth line, and

the switching means includes a first switch which opens or closes between at least one of the input  
15 section and the output section of the amplifier means in the oscillating unit and the high frequency earth line of the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the  
20 oscillating unit between the oscillating state and the oscillation stop state.

11. A radar oscillator according to claim 2, characterized in that the oscillating unit has an element to set a resonance frequency of the oscillator  
25 in the oscillating unit outside of an oscillation enable range in the oscillating unit, and

the switching means includes a second switch

which connects or disconnects the element to set the resonance frequency of the resonator in the oscillating unit outside of the oscillation enable range to and from the oscillating unit based on the pulse signal  
5 indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

12. A radar oscillator according to claim 2,  
10 characterized in that the oscillating unit has a power supply line for the amplifier means in the oscillating unit, and

the switching means includes a third switch which opens or closes the power supply line for the amplifier  
15 means in the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

20 13. A radar oscillator according to claim 2, characterized in that the oscillating unit selectively has a high frequency earth line, a power supply line for the amplifier means in the oscillating unit, and an element to set a resonance frequency of the resonator  
25 in the oscillating unit outside of an oscillation enable range in the oscillating unit, and

the switching means includes a plurality of

switches obtained by selectively combining:

5        a first switch which opens or closes between at least one of the input section and the output section of the amplifier means in the oscillating unit and the high frequency earth line based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state;

10       a second switch which connects or disconnects the element to set the resonance frequency of the resonator in the oscillating unit outside of the oscillation enable range to and from the resonator based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state; and

15       a third switch which opens or closes the power supply line for the amplifier means in the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

20       14. A radar oscillator according to claim 3, characterized in that the oscillating unit has a high frequency earth line, and



the switching means includes a first switch which opens or closes between at least one of the input section of the amplifier at a first stage of the plurality of amplifiers and the output section of the amplifier at a final stage of the plurality of  
5 amplifiers and the high frequency earth line of the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the  
10 oscillating unit between the oscillating state and the oscillation stop state.

15. A radar oscillator according to claim 3, characterized in that the oscillating unit has an element to set the oscillating unit outside of an  
15 oscillation enable range, and

the switching means includes a second switch which connects or disconnects the element to set the oscillating unit outside of the oscillation enable range to and from the oscillating unit based on the pulse signal  
20 indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

16. A radar oscillator according to claim 3,  
25 characterized in that the oscillating unit has a power supply line for said plurality of amplifiers serving as the amplifier means in the oscillating unit, and

the switching means includes a third switch which opens or closes the power supply line for at least one amplifier of the plurality of amplifiers in the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

17. A radar oscillator according to claim 3, characterized in that the oscillating unit selectively has a high frequency earth line, a power supply line for said plurality of amplifiers serving as the amplifier means in the oscillating unit, and an element to set the oscillating unit outside of an oscillation enable range, and

the switching means includes a plurality of switches obtained by selectively combining:

a first switch which opens or closes between at least one of the input section of the amplifier at the most frontal stage of said plurality of amplifiers serving as the amplifier means in the oscillating unit and the output section of the amplifier at the final stage of said plurality of amplifiers and the high frequency earth line of the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the

oscillating state and the oscillation stop state;

a second switch which connects or disconnects the element to set the oscillating unit outside of the oscillation enable range to and from the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state; and

a third switch which opens or closes the power supply line for at least one amplifier of the plurality of amplifiers in the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

18. A radar oscillator according to claim 4, characterized in that the oscillating unit has a high frequency earth line, and

the switching means includes a first switch which opens or closes between at least one of the input section and the output section of the FET serving as the amplifier means in the oscillating unit and the high frequency earth line of the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the

oscillating state and the oscillation stop state.

19. A radar oscillator according to claim 4,  
characterized in that the oscillating unit has an  
element to set a resonance frequency of the resonator  
5 in the oscillating unit outside of an oscillation  
enable range in the oscillating unit, and

the switching means includes a second switch which  
connects or disconnects the element to set the  
resonance frequency of the resonator in the oscillating  
10 unit outside of the oscillation enable range in the  
oscillating unit to and from the oscillating unit based  
on the pulse signal indicating the transmission timing  
of the radar wave, thereby alternately changing the  
operating state of the oscillating unit between the  
15 oscillating state and the oscillation stop state.

20. A radar oscillator according to claim 4,  
characterized in that the oscillating unit has a power  
supply line for the FET serving as the amplifier means  
in the oscillating unit, and

20 the switching means includes a third switch which  
opens or closes the power supply line for the FET in  
the oscillating unit based on the pulse signal  
indicating the transmission timing of the radar wave,  
thereby alternately changing the operating state of the  
25 oscillating unit between the oscillating state and the  
oscillation stop state.

21. A radar oscillator according to claim 4,

characterized in that the oscillating unit selectively has a high frequency earth line, a power supply line for the FET serving as the amplifier means in the oscillating unit, and an element to set a resonance  
5 frequency of the resonator in the oscillating unit outside of an oscillation enable range in the oscillating unit, and

the switching means includes a plurality of switches obtained by selectively combining:

10 a first switch which opens or closes between at least one of the input section and the output section of the FET serving as the amplifier means in the oscillating unit and the high frequency earth line of the oscillating unit based on the pulse signal  
15 indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state;

a second switch which connects or disconnects the  
20 element to set the resonance frequency of the resonator in the oscillating unit outside of the oscillation enable range in the oscillating unit to and from the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby  
25 alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state; and

a third switch which opens or closes the power supply line for the FET in the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

22. A radar oscillator according to claim 5, characterized in that the oscillating unit has a high frequency earth line, and

the switching means includes a first switch which opens or closes between at least one of the input section of the amplifier at a first stage of the plurality of amplifiers serving as the amplifier means in the oscillating unit and the output section of the amplifier at a final stage of the plurality of amplifiers based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

23. A radar oscillator according to claim 5, characterized in that the oscillating unit has an element to set the oscillating unit outside of an oscillation enable range, and

the switching means includes a second switch which connects or disconnects the element to set the oscillating unit outside of the oscillation enable range to

and from the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

24. A radar oscillator according to claim 5, characterized in that the oscillating unit has a power supply line for said plurality of amplifiers serving as the amplifier means in the oscillating unit, and the switching means include a third switch which opens or closes the power supply line for at least one amplifier in the plurality of amplifiers in the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.

25. A radar oscillator according to claim 5, characterized in that the oscillating unit selectively has a high frequency earth line, a power supply line for said plurality of amplifiers serving as the amplifier means in the oscillating unit, and an element to set the oscillating unit outside of an oscillation enable range, and

the switching means includes a plurality of switches obtained by selectively combining:

a first switch which opens or closes between at

least one of the input section of the amplifier at the most frontal stage of the plurality of amplifiers serving as the amplifier means in the oscillating unit and the output section of the amplifier at a final stage of the plurality of amplifiers and the high frequency earth line of the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state;

a second switch which connects or disconnects the element to set the oscillating unit outside of the oscillation enable range to and from the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillator between the oscillating state and the oscillation stop state; and

a third switch which opens or closes the power supply line for at least one amplifier in the plurality of amplifiers in the oscillating unit based on the pulse signal indicating the transmission timing of the radar wave, thereby alternately changing the operating state of the oscillating unit between the oscillating state and the oscillation stop state.